

**2nd IHO-HSSC Meeting
Rostock, Germany, 26-29 October 2010**

Paper for Consideration by HSSC

HSSC1/26 - Minimum standard necessary for safe navigation

Submitted by:	Sweden
Executive Summary:	This paper proposes a concept that will result in a quality indicator designed for the mariner and answering the question of if data quality in ENC, printed chart or nautical publication fulfils a minimum standard necessary for safe navigation. The indicator is a result of quality aspects of all important information concerned in the nautical product and reported and portrayed in an easy to understand manner.
Related Documents:	S-4, Regulations of the IHO for International Charts and Chart Specifications of the IHO S-44, IHO Standards for Hydrographic Surveys S-100, IHO Universal Hydrographic Data Model
Related Projects:	Development of S-101 and other ongoing work

Introduction / Background

Sweden recognises a need for the hydrographic community to improve the means of reporting and portraying an indicator for the total survey quality in their nautical products, be it ENC or printed charts or other relevant products. At present there is no easy way for the mariner to evaluate if the information provided by the nautical product fulfils minimum demands for safe navigation.

In S-57 and its ENC product specification a meta quality object type M_QUAL is specified and especially its attribute CATZOC is used to report quality regarding depths only. In printed charts the concept of source diagrams is commonly used for basically the same purpose. In our experience, also based on reactions from mariners, these concepts are very difficult to understand for the end user. It is difficult to create a useful portrayal of CATZOC in an ECDIS and source diagrams in charts are hard to interpret.

The hydrographic community has a problem with nautical products covering areas where the survey data is of poor quality and this is not clearly indicated in the products. Sweden has, as probably most IHO member states, a list of cases where accidents and incidents have occurred where poor data quality may have contributed to the series of events. In Swedish waters there are also areas identified where there is intense commercial shipping and where it is discussed whether the total survey quality matches the requirements necessary for safe navigation or not.

When considering the task to create a useful quality indicator there is a need to include requirements on quality information for all the important feature types, not only depths, in our products. In S-57 there are several classes for meta objects, other than above mentioned M_QUAL, such as M_ACCY and M_SREL. They provide a possibility to handle quality information in general for most of the information in ENC but they are not designed to provide an easy to understand overall quality indicator and there is no portrayal defined in ECDIS for these objects.

The concept described in this paper has earlier been presented at the DQWG meeting, May 2010, in Norfolk, Virginia, USA.

The need for improvements in reporting quality information was addressed by Sweden at HSSC1 resulting in action HSSC1/26 to which this paper is the response.

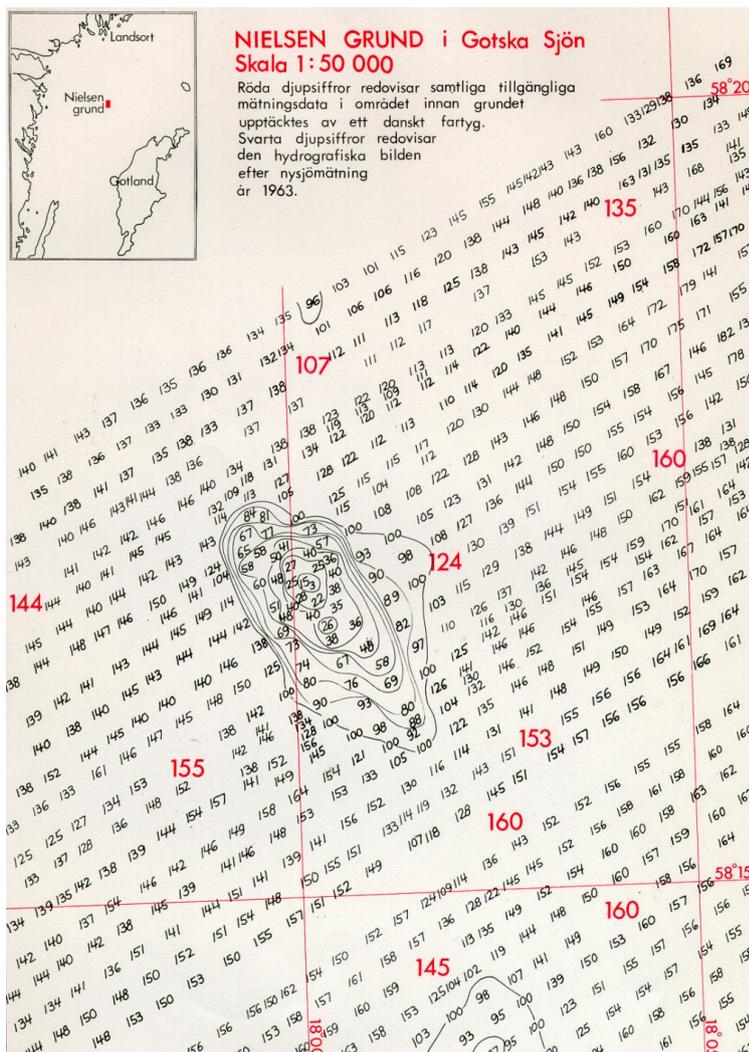
Some examples highlighting a need for improved quality indicators

Southern entrance Falsterbo Kanal (Baltic Sea)



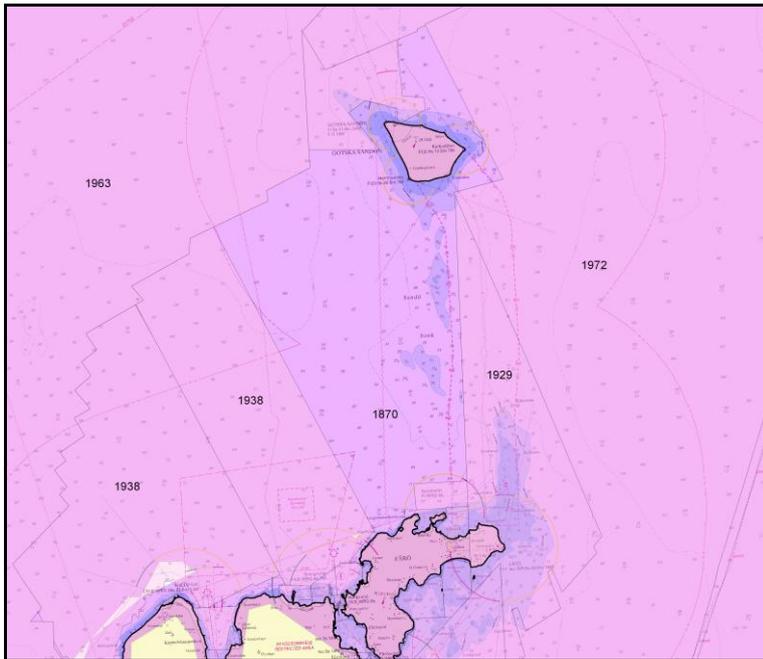
Magenta lines and symbols showing currently charted shore line constructions and navigational aids out of position.

Nielsen Shallow (Baltic Sea)



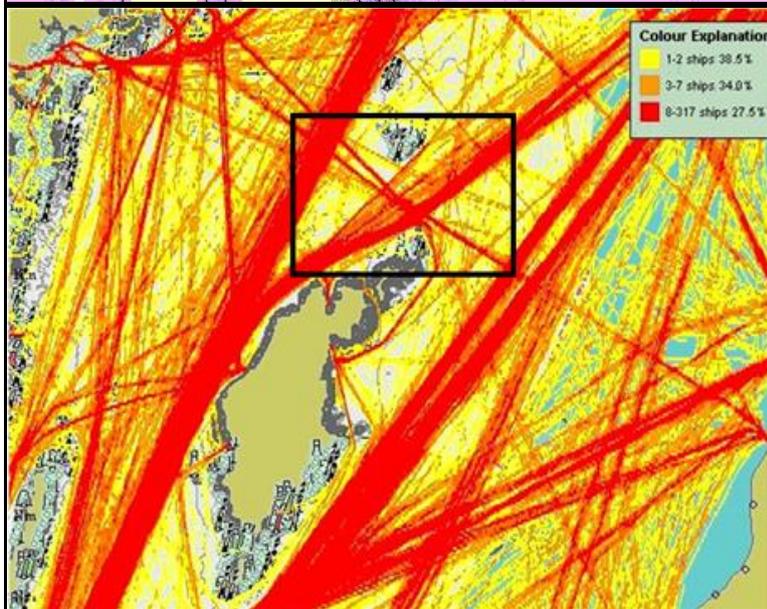
In this area in Sea of Gotland until 1963 the only existing soundings were those depicted in red with spacing between 2 and 8 kilometers. From an apparent plane of approx 130 meters depth a shoal with a shallowest depth of 15 meters was discovered. Could something similar appear somewhere else where modern surveys are lacking?

Sandö Bank (Baltic Sea)

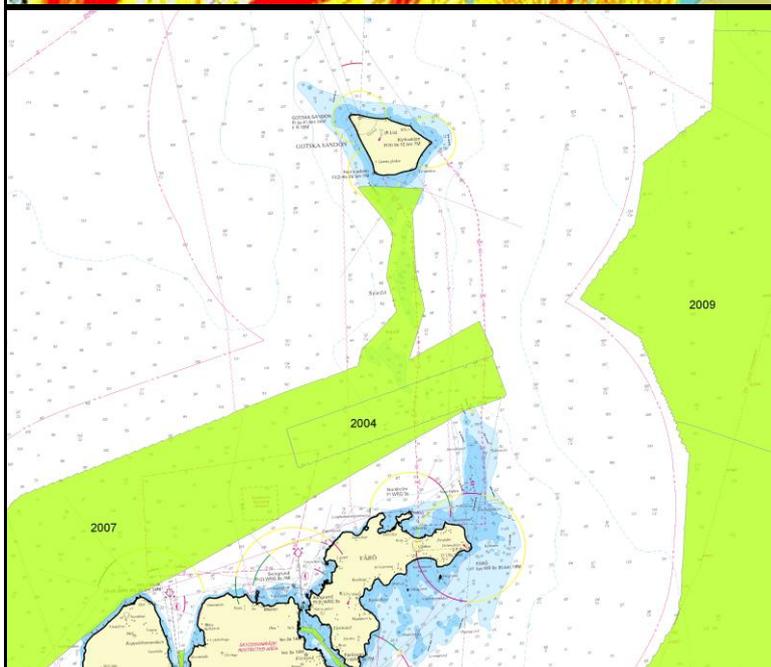


Monitoring of recorded AIS tracks has revealed somewhat surprising vessel traffic patterns in various areas. On Sandö Bank the shallowest depth charted is 8 meters. The responsible HO, but not the mariner, has the knowledge that hydrographic surveys are old and sparse. Hydrographic survey efforts are under way to deal with the most important parts of the area.

Survey status 2004 – the indicated years represents time period for performed surveys. Note 1870 for central parts of the bank.



Recorded AIS tracks presenting vessel traffic during short period 2004.



The indicated years representing new surveys performed 2004-2009.

Grounding of the Octopus barge 2006, Orkney Islands (North Sea)

This is another related example where survey quality and presentation as CATZOC were the issues and has previously been discussed in CHRIS.

“CHRIS 19-05.1B Enhancing the presentation of Survey Quality in ENC”

“UK MAIB Report No 18/2007, published 9 August 2007: ‘Report of the investigation of the grounding of the jack-up barge Octopus towed by the tug Harald, Stronsay Firth, Orkney Islands, 8 September 2006’.”

Analysis/Discussion

A baseline for the reasoning in this paper is established by taking SOLAS chapter V regulation 9 on Hydrographic Services into consideration. As an official authority obligated by SOLAS we should have proper processes in place to handle ‘all nautical information **necessary for safe navigation**’ and provide the relevant products. The regulation wordings gives room for some interpretation and each authority must define the implications for its operations. Nevertheless we must interpret the regulation as demanding and each authority concerned shall do everything within its ability to provide all data and products necessary for safe navigation. We see in Sweden that there are considerable areas where the fulfillment of the regulation is subject for discussion. There is in our opinion a strong requirement of somehow presenting this as a quality indicator in the nautical products.

For the next step in the construction of an improved quality indicator we suggest looking into S-44 where **minimum standards** for hydrographic surveys is discussed, defined and then specified in Table 1 of S-44. We especially note that S-44 also includes quality specifications for types of features, other than depths, significant to navigation. There is a kind of paradox in the fact that the hydrographic survey standard S-44 contains quality requirements for other feature types and that the electronic chart standard S-57 and the use of CATZOC deals only with quality of soundings.

The procedure defined in S-44 is first to classify the geographical area of interest with regard to the characteristics of maritime traffic and to the bathymetry. This then gives the quality requirements (the orders in S-44) for performing survey and not only concerning depths. To the question of if the survey result fulfills S-44 the answer then is either yes or no.

The responsible national authority may adjust the indicated requirement levels of S-44 to best suit conditions in their respective area of concern.

Sweden considers S-44 as a good starting point for the development of a quality indicator that could be of use for the mariner if properly designed and with an intuitive and unambiguous portrayal in the nautical products. The suggestions to follow can be seen as an extended implementation of S-44.

When combining essential keywords from S-44 and SOLAS V regulation 9 the result is **minimum standard necessary for safe navigation** and here abbreviated MSNFSN which is used in this paper. By using SOLAS V regulation 9 and S-44 as a foundation the concept is based on already adopted regulations and standards.

It is not likely in the near future that the MSNFSN reporting will be an automatic result of underlying quality parameters. Each responsible authority decides the MSNFSN result for a given area based on analysis and synthesis of underlying quality data.

The concept in brief:

- Develop an easy to understand quality indicator adapted for the mariner and designed for official nautical charts, ENC and nautical publications.
- The quality indicator should give the mariner a straight answer to the question: Does the information fulfill minimum standard necessary for safe navigation?
- The quality indicator should generally give a straight answer to the mariner regardless of whether using a paper chart, an ECDIS or another nautical publication for navigation.

- The quality indicator should give the responsible authority the possibility to proclaim whether whole or specified geographical areas of official nautical charts, ENC's or specified nautical publications, fulfill minimum standard necessary for safe navigation (MSNFSN).
- MSNFSN presuppose that:
 - all information is managed with acceptable total propagated uncertainty, reliability, completeness and kept up-to-date and that generalizations and compilations are performed in a manner ensuring nautical safety
 - all information in products concerned must comply with S-44 minimum standard or, for feature classes not mentioned in S-44, must comply with a minimum standard equivalent to S-44
 - MSNFSN attribute must be mandatory (attribute value equals {'yes', 'no', 'not defined'})
 - MSNFSN attribute value is used for portrayal only if the value is 'no' or 'not defined'

Conclusions

- The community needs an easy to understand quality indicator adapted for the mariner and designed for official nautical charts, ENC and nautical publications.
- The concept gives the responsible authority the possibility to proclaim whether whole or specified geographical areas of official nautical charts, ENC's or specified nautical publications, fulfill minimum standard necessary for safe navigation.
- The concept enables development of an easy to understand portrayal of geographical areas where the quality of information is poor. Further studies of suitable portrayal are necessary.
- The concept is based on already adopted regulations and standards developed by IMO and IHO.
- The mariners need for detailed information about the data quality should be considered for all feature classes.

Recommendations

HSSC should task the relevant working groups to develop the concept of MSNFSN in all aspects found necessary and a possible division of tasks is:

- Guidelines for the encoding of MSNFSN should be developed by DQWG.
- Quality attributes for all relevant feature classes should be developed by DQWG.
- Relevant WG considers a revision and expansion of S-44.
- The use of MSNFSN should be included in S-100/S-101 by TSMAD.
- Portrayal of MSNFSN should be developed by CSPCWG and DIPWG for printed charts and ENC respectively.
- The use of MSNFSN should be included in the work of SNPWG.

Justification and Impacts

Development of the concept outlined in this paper will result in a quality indicator designed for the mariner and answering the question of if data quality in ENC, printed chart or nautical publication fulfils a **minimum standard necessary for safe navigation**. The indicator is a result of quality aspects of all important information concerned in the nautical product and reported and portrayed in an easy to understand manner.

Action Required of HSSC

The HSSC is invited to endorse the proposal.